ABSTRACT OF THE DISCLOSURE

A micromachined device such as a solid-state liquid chemical sensor for receiving and retaining a plurality of separate liquid droplets at desired sites, a method of making the device and a method of using the device are provided. The technique works for both aqueous and solvent-based solutions. The device includes a substrate having an upper surface, and a first set of three-dimensional, thin film well rings patterned at the upper surface of the substrate. Each of the wells is capable of receiving and retaining a known quantity of liquid at one of the desired sites through surface tension. A method for patterning a membrane/solvent solution results in reproducibly-sized, uniformly-thick membranes. The patterning precision of this method allows one to place the membranes closer together, making the sensors smaller and less expensive, and the uniform film thickness imparts reproducibility to the sensors. The final film thickness can be controlled over a 3 to 50 micron range, and lateral dimensions can be as small as 20 microns using conventional materials. The simple patterning steps can be done on full wafers in a mass fabrication process. A second set of well rings may be photo-patterned at the same time as the first set of well rings to isolate functional groups on top of ion-selective membrane.